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**To:** Michael Collins, Director of Public Services, City of Beverly

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**Cc:** Tony Omobono, Tetra Tech

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**From:** Mark Negrotti, Tetra Tech  
Alan Flak, Tetra Tech  
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**Date:** March 16, 2022

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**Subject:** City of Beverly, MA  
National Grid N-192, 115 KV Transmission Main Constructability Peer Review  
Draft Review Memorandum

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## 1. Overview and Background

The City of Beverly (City) contracted Tetra Tech (Tt) for peer review services related to the proposed N-192 115 KV electrical transmission main in Beverly, MA. Tt was tasked with specifically reviewing the “*Constructability Review to Install a New N-192 115 KV Transmission Line on the MBTA Right-of-Way in Beverly, MA*,” report dated September 17, 2018 (Report), prepared by Electrical Consulting Engineers, P.C. (ECE). The peer review will assist in providing an opinion on the information included in the Report and identify constructability challenges related to constructing the electric utility in the Massachusetts Bay Transportation Authority (MBTA) railroad (RR) right-of-way (ROW).

The limit of study is between the southernmost point of the MBTA Rockport Branch Commuter Rail at the Route 62, Elliot Street, crossing to the northernmost point to the Boyles Street crossing. According to the ECE memorandum, the existing RR ROW is 66-feet wide and includes two sets of tracks, the M-191 overhead transmission line, two direct buries 23 kV circuits, the existing N-192 direct buried transmission cables, and overhead poles supporting RR communication lines, track switches, and RR signal equipment. Along sections, there is also a 36-inch diameter vitrified clay pipe and multiple culvert crossings below the tracks.

There are five RR crossings within the approximate 1.8-mile study limit. The area is bound by private residences and commercial space. Approximately 4,000 linear feet abuts conservation land. If construction of the new electric transmission main was considered, access would have to be primarily from the crossing locations unless private easements were obtained

## 2. Data Collection

### Correspondence:

- MBTA and MBTA representatives for the current Positive Train Control (PTC) Project
  - A call was conducted on Thursday, February 3, 2022, between Tt and MBTA representatives. The call was conducted so that Tt could better understand the estimated

project schedule for the PTC project and establish any impacts to the potential National Grid duct bank project.

- Greystone, Massachusetts Realty Group – Real Estate Permitting Authority for the MBTA.
  - Greystone was contacted to obtain a better understand the permitting process and determine if the MBTA would consider a pre-application meeting to review the proposed project prior to any formal permit submissions.

Documentation:

- *“Constructability Review to Install a New N-192 115 KV Transmission Line on the MBTA Right-of-Way in Beverly, MA,”* report dated September 17, 2018, prepared by Electrical Consulting Engineers, P.C.
- Railroad Operations Directorate (Directorate)
- Insurance Requirements
  - Insurance requirements for filing were obtained. Presumably, National Grid insurance would cover the work, but this has not been confirmed.
- Previous correspondence from National Grid received from Michael Collins. The email included OSHA requirements related to working near electrical transmission mains and other typical National Grid safety protocols.

The primary guidance documentation utilized as part of the review are the Directorate and OSHA requirements for working adjacent to electric transmission mains as reflected in email correspondence with National Grid. Upon review of the Directorate, Tt established many areas where construction would not be permitted without special approval from the MBTA. These areas are avoided as they pose safety concerns for the MBTA as work in these zones will potentially compromise the integrity of the rails and other infrastructure. The following is a list of those locations that pertain to this project. These locations are also identified on a typical cross section developed by ECE and included herein.

- Section II, 2.16.B. Contractors should remain 15 feet away from the closest rail of the closest track. They can be closer with arrangements with the railroad, but this would be the general clearance requirements.
- Section II, 3.02. Swinging booms or chutes should be no closer than 5' to the center line of a track or wire line.
- Section II, 3.03. Need to stay 10 feet away from any wire or cable
- Based on Plate VI in section V (page 97 of pdf). It implies that we would need 3 feet minimum cover over the potential new conduit.
- Section VIII. Blasting will only be permitted in special cases where no practicable alternative is available.

In the Directorate, Tt could not find specific guidance about clearances for conduit location, but if we assume that the placement of pipes would be similar, then Section IV 2.02.E implies 25' from the center of track. This is visually shown in PLATE III in section IV on page 83 of the Directorate. The Directorate provides guidance, but it appears that exceptions may be made with approval from the MBTA. Any deviations from the Directorate are carefully reviewed and not necessarily approved.

The following is guidance provided by Faith Hassell of National Grid, verbatim, in an email dated February 15, 2022, to Michael Collins. As these requirements are OSHA standards, it is assumed that they would also apply to a new National Grid transmission man installation in this corridor. These requirements are of special interest/concern for the construction of the new N-192 electric infrastructure.

2.1.4. All OSHA regulations governing working clearances to electric distribution and transmission lines shall be followed. Although regulations 29 CFR 1926 Subpart CC and 29 CFR 1926.1501 may be specific to equipment that can hoist, lower, and horizontally move a suspended load, all equipment operating within a right of-way shall maintain the clearances specified in these regulations, including but not limited to cranes, backhoes, excavators, forklifts, pile drivers, and drill-rigs.

2.1.4.1. In accordance with 1926.1408, if the Requestor asks to encroach upon the 20-foot clearance requirement and requests voltages of electric lines near the proposed work or activity, the Requestor shall provide an aerial photograph or detailed survey plan delineating the area of work or activity in proximity to electric lines and structures. Requests may be emailed to [TransmissionEngineering@NationalGrid.com](mailto:TransmissionEngineering@NationalGrid.com) or mailed to National Grid c/o Transmission Engineering, 40 Sylvan Road, Waltham, MA 02451.

3.1.1. The Requestor shall operate equipment and vehicles at least 50 feet horizontally away from any electric transmission line pole, tower, overhead wire, guy wire, or guy anchor.

3.1.2. When making a rough-cut during excavation, the Requestor shall disturb no earth within an area bounded by a line drawn 25 feet plus 2.5 times the depth of the cut from the nearest electric transmission line pole, tower leg, guy wire, or guy anchor, but not less than 50 feet. Upon completion of the rough cut, the slopes of the bank shall be graded on a slope no steeper than one vertical to five horizontal and stabilized with vegetation or riprap. The top of the slope shall be at least 50 feet from the nearest pole, tower leg, guy wire, or guy anchor. In cases where these criteria cannot be met, the Requestor may, at the discretion of Transmission Engineering, need to engage a qualified Professional Engineer familiar with Transmission work and perform a stability analysis proving stability of both the proposed excavation and the transmission structure and/or guy anchor.

3.1.3. The Requestor shall not store or use explosives within the right-of-way.

3.1.4. The Requestor shall locate all ground wires buried in areas to be excavated and shall protect them against damage. If a buried ground wire is broken, the Requestor shall prevent anyone from touching it and shall notify National Grid.

For the clearance from the N-192 underground lines and 23kV underground lines:

National Grid asks for 4ft from the edge of the duct bank, concrete cap, or nearest phase. For the 23 kV it's 4 feet from the nearest phase. For the N-192 it's 4 feet from the edge of the concrete cap.

Additionally, National Grid indicated that they would never use blasting within the MBTA ROW and that they haven't used blasting in any recent years and do try to stay away from this method.

The exhibits on the next page identify locations the Directorate where construction is not prohibited without special approval. As reflected in the exhibits, there is not an apparent open area to install the new transmission line without obtaining variances and special approval from both the Directorate and OSHA standards.

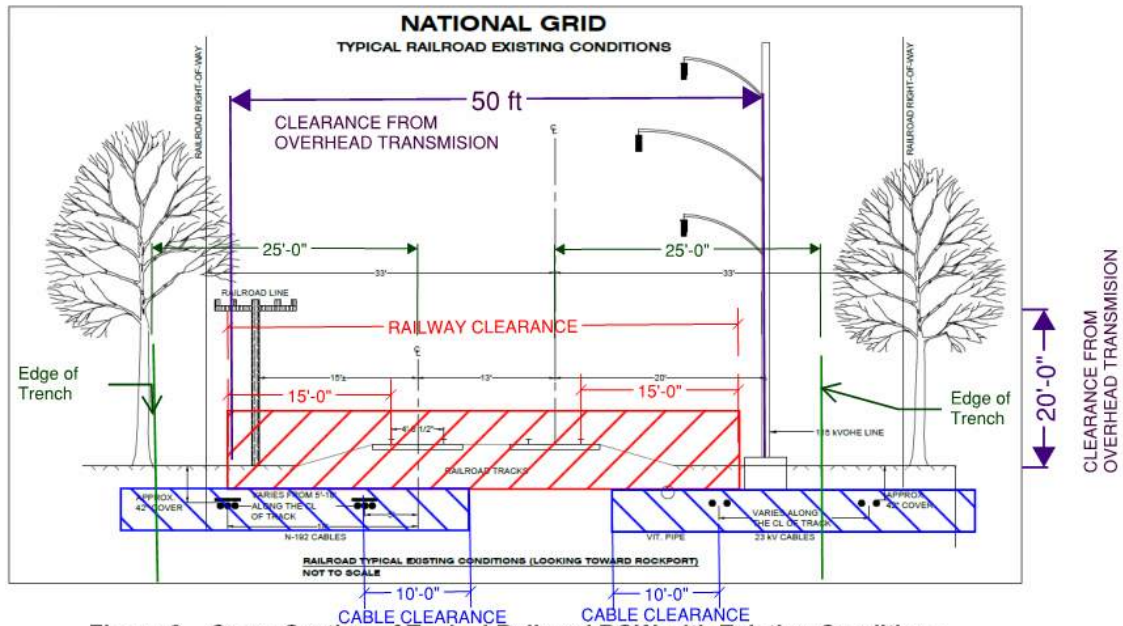


Figure 2 – Cross Section of Typical Railroad ROW with Existing Conditions

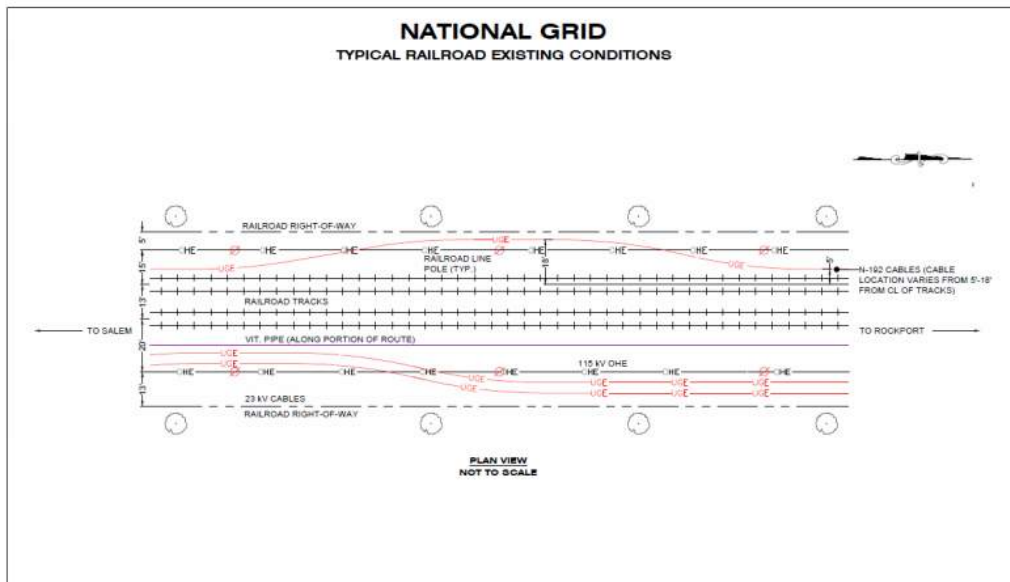


Figure 3 – Plan View of Typical Railroad ROW with Existing Conditions

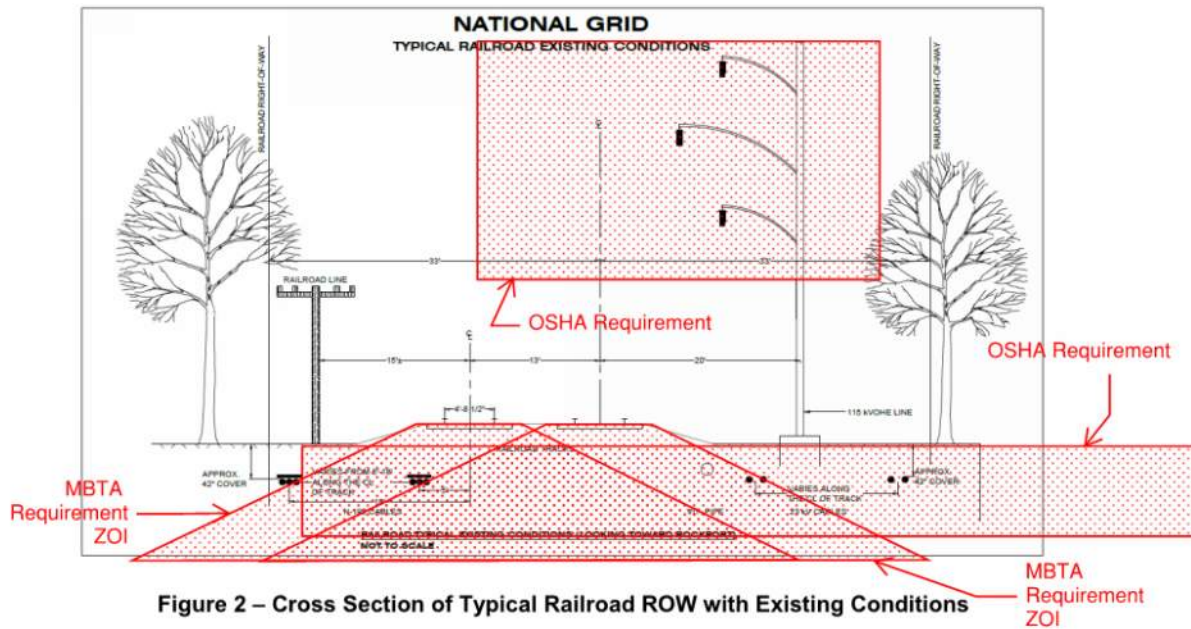


Figure 2 – Cross Section of Typical Railroad ROW with Existing Conditions

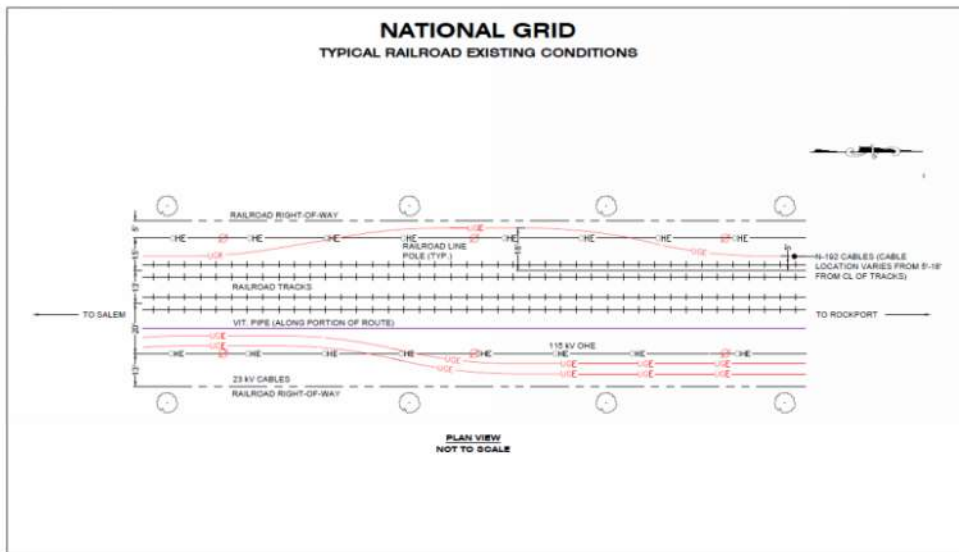


Figure 3 – Plan View of Typical Railroad ROW with Existing Conditions

September 17, 2018

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**Exhibit B: Regulated Areas**

## **Review Summary**

The assumption is that the electric transmission main would be installed within the RR ROW to avoid issues with private property owners. There are a few potential ways to construct the transmission main that include open cut excavation, utilizing a trenchless excavation method, or a combination thereof. Open cut has numerous constructability challenges as identified herein. Trenchless methods also introduce numerous challenges and requires a thorough understanding of subsurface soil conditions and other existing infrastructure. Some trenchless excavation methods would be eliminated from consideration with the presence of large boulders and bedrock. Regardless, trenchless installation methods alone could not be utilized given the requirements for access structures and multiple access pits along the alignment. Therefore, open cut excavation would still be required to install some or all of the proposed electric transmission main.

If the proposed project was to move forward it would involve the following constructability challenges:

- The ideal location for the new conduit to be installed completely within the ROW would be between the existing cables, and therefore close to and sometimes below the east track. This would require special approval from MBTA to work closer to the existing track while it is in service and will result in time when it will likely have to be shut down to complete the work.
- Currently there are many obstructions located within the existing ROW. Many of these obstructions cannot be easily removed and/or relocated such as train station landings, signal equipment, related gear, ledge outcrops, and other critical National Grid infrastructure such as buried and below grade electric infrastructure.
- The proposed N-192 conduit line would require the installation of new 8'x24' underground vaults most likely be a two-piece precast structure which would be set with a crane at approximate increments of every 1,500 linear feet along the proposed conduit line. The installation of these proposed vaults poses several challenges;
  1. Locating the proposed vaults within the existing RR ROW will very likely be in conflict with existing RR features or equipment.
  2. Siting the vaults outside the zone of influence will be near impossible given the zone of influence limits. If the vault is to be placed in a zone of influence this will most likely require sheeting and/or shoring which poses additional challenges for this installation.
  3. There is limited space within the ROW to lift the vaults into place. Careful consideration to the required crane location is needed and these locations will need to be engineered and reviewed to confirm the setback requirements from the existing overhead high voltage wires are met.
- As stated in ECE memo the MBTA is under a federal mandate to install a Positive Train Control (PTC) system with completion expected on or about year 2025. The PTC will involve new communication bungalows, cabinets, equipment, and conduits. The MBTA will unlikely allow the installation of additional utilities within the proposed corridor area until the PTC system is completed. Further, the MBTA has undertaken a Fiber Resiliency project that will follow the PTC project. The status of the Fiber Resiliency project is unknown, but it is intended to be completed upon the completion of the PTC project. The Fiber Resiliency project will likely push the electric transmission main project further out in schedule.
- The project would have to consider of an existing 36-inch diameter clay pipe located on within the existing ROW. This existing clay pipe will need to be evaluated and will most likely need to be CIPP lined to accommodate the loading of the heavy equipment and trucks necessary for the installation of the proposed conduits.

- The project will need address how the conduits will be installed at culvert crossings including environmental permitting.
- Ledge is a concern, and the method of removal will need to be addressed. As blasting ledge within the RR ROW will be an issue, ledge removal will most likely be drilling and hoe ramming the ledge which is expensive and disruptive to the adjacent residents. It is our understanding the MBTA and National Grid refrains from blasting within the RR ROW and adjacent to electrical transmission mains per OSHA standards.
- Greystone, Massachusetts Realty Group, suggested that if National Grid was considering constructing the new N-192 conduit that permitting will likely be managed in phases. When asked if Greystone and/or the MBTA would participate in a pre-application meeting, it was indicated that discussions would only occur when a permit application and related fees were submitted. It was perceived that any deviations/variance requests from the Directorate would be a challenge. Based on review of the Directorate, and OSHA guidance, numerous exceptions would be needed to allow for construction of the new N-192 electric transmission main. Although not specifically discussed in great detail, much of the proposed N-192 construction would require RR service alterations further complicating approvals if allowed.
- Due to the limited existing ROW width, existing infrastructure within it, and MBTA and OSHA setback requirements, the proposed underground conduits would possibly need to be installed along the edges and/or in many locations beyond the existing ROW limits. This would require the project to acquire both temporary and/or permanent easements from abutters for the installation of the proposed conduits.
  - If work were to occur outside the RR ROW limits, obtaining easement and/or land taking could take extended periods of community involvement/hearings to obtain current landowner approvals. The project could be at risk even if one existing landowner does agree with the project and/or provide the right to enter their property by an easement.
  - Proposed project will require a great deal of land clearing and tree removal along the edge of the existing RR ROW.

## **Findings**

In general, we concur with ECE's findings where there are many significant challenges in constructing the proposed N-192 115Kv line either below grade or overhead which will most likely prohibit and/or significantly delay the construction of the proposed line.

It is highly unlikely that National Grid could meet compliance with the Directorate requirements and would need to obtain special approval for numerous items and possibly have to demonstrate that there are no other viable alternatives to construct the electric transmission line.

From our review it is evident that there is very limited space within the RR ROW to construct the proposed transmission line and the allowable setback requirements. In addition, we understand that the MBTA will not allow new work within the limits of their existing ROW until such time their federally mandated Positive Train Control (PTC) system is operational with an anticipated schedule of completion in year 2025 as well as the fiber resiliency project in which the schedule is currently unknown.

There are several other existing features and challenges that need to be considered such as ledge outcrops and the very high probability of encountering ledge below grade which will need to be removed by mechanical means (hoe ramming) which slows production, is noisy, and has increases cost. It is unknown if the MBTA would allow blasting within the RR ROW given the sensitive infrastructure within it. In order to minimize impacts with Directorate and OSHA standards, much of the proposed transmission line would need to be installed outside of the zone of influence of the existing RR tracks amongst other things. That being the case, the proposed transmission line would most likely be installed at the outer edges of the ROW or

potentially in new easements, which will require significant permitting for tree removal changing the landscape for the residents abutting the RR ROW.

If the proposed transmission line is installed overhead combining the existing M-191 on the existing poles there are also several challenges which need to be addressed. The existing pole foundations may need to be upgraded and require heavy equipment to enter onto the ROW and tree removal. Further, for worker safety purposes, careful adherence to clearances from the existing overhead lines is necessary. Given the limitations, it would potentially force the proposed transmission line into private property raising numerous temporary and permanent easement issues that may never be resolved.

Based on response to date, the MBTA needs to complete the PTC project before any additional work within the ROW was approved. Further, it is likely that the Fiber Resiliency project will follow the PTC project further impacting any new construction in the RR ROW. At this time, it appears that the PTC project will be completed by 2025 (possibly earlier). However, the Fiber Resiliency schedule is unknown putting the potential construction new N-192 project in a state of uncertainty even if approved. The MBTA has numerous other initiatives currently in process including multiple bridge replacement projects. Not only will these projects likely impact access to the ROW for new construction but will also likely be an issue for acquiring required MBTA support including flagmen and signal staff. The new PTC system will add communication structures, cabinets, equipment, and conduits resulting in additional constraints and difficulties for the proposed N-192 115 kV transmission line to navigate through when combined with several active MBTA train stations existing landings, structures, equipment, and underground piping.

Permitting impacts of the project are currently difficult to assess. With that, the project may be subject to MEPA, local Con Comm, and MBTA jurisdiction amongst other permits. A significant amount of design detail would need to be developed to assess impacts more accurately.

To surmise, It is in general agreement with ECE's memorandum which indicates that the installation of a new N-192 transmission line poses numerous significant constructability challenges. Given the constructability challenges, it is unknown whether the MBTA and National Grid would approve of the work without demonstration of other viable alternatives.

If the project were to proceed, the following are some potential expected steps.

1. Meet with MBTA, National Grid, and other City stakeholders to review the proposed project. It would be beneficial to establish constraints and non-starters if they exist at this time. At this time, it is important to provide both the MBTA and National Grid with possible impacts and deviations from the Directorate and OSHA standards.
2. Based on the results of the previous step, obtain an accurate existing conditions survey from a registered professional land surveyor that includes limits of RR ROW and private property, existing easements, utilities and utility crossings, grading, wetlands and other resource areas, and all other existing site features. If a survey is to be completed, approval from the MBTA is necessary to access the RR ROW.
3. Perform a comprehensive subsurface investigation program to characterize subsurface soil conditions. This will also require approval from the MBTA. As the anticipated subsurface investigation program will include test borings, the MBTA will have concerns about digging in and around the rails.
4. Based on an accurate existing condition plan and understanding of concurrent and future MBTA infrastructure, evaluate possible conceptual alignments for the new transmission main maintaining as much separation from existing infrastructure per the Directorate and considering OSHA standards. The

intent is to stay within the RR ROW completely to avoid private property easements although some temporary easements are expected. Based on initial review of available data, it appears that the proposed transmission main will need to have a flexuous alignment to avoid critical existing infrastructure and site features. With that, it is very likely that the new transmission main will require temporary rail removal and/or service interruption.

5. Meet with the MBTA and National Grid to review the conceptual alignment.
6. Confirmation of any additional approvals necessary at this time to complete the data collection phase.
7. Develop the conceptual plan and continue discussions with the MBTA to review the concepts and impacts. There are numerous RR Operations Directorate requirements that will need to be addressed in order for this project to continue to design and construction. It is likely that the MBTA will require an alternatives analysis to demonstrate why the new transmission main needs to be installed within the RR ROW.
8. Provided that the MBTA and National Grid see the project as feasible, develop the conceptual design suitable for a formal submission to the MBTA and its RR Real Estate Representatives, Greystone.

### Route 62 Crossing



Looking Southbound. Narrow ROW with existing buildings adjacent to the rails.



Looking Northbound. Same issue of existing buildings and RR infrastructure in close proximity.

## Route 1A Crossing



Looking Southbound. Narrow crossing and existing buildings in close proximity.



Looking Northbound. Existing buildings and steep side slopes with possible ledge.

### Spring Street Crossing



Looking Southbound. Narrow ROW. Sidewalks and existing buildings in close proximity.



Looking Northbound. Narrow ROW with Monserrat Train Station in view.

## Essex Street Crossing



Looking Southbound. Commuter Rail platforms in conflict. Narrow ROW.



Looking Northbound. Narrow ROW with existing buildings in close proximity.

### **Boyles Street Crossing**



Looking Southbound. Narrow ROW with existing buildings in close proximity. Resource areas to the east.



Looking Northbound. Narrow ROE and existing ledge to the east.